MANN
SF
505
.Q1

+
OVERSIZE

Cornell University Library
SF 505.Q1

The mallard; its breeding, shooting and p

3 1924 003 085 242

mann

Olin C. K[illegible]

THE MALLARD

Its Breeding, Shooting and Preserving

by

E. A. QUARLES
Director Department of Game Breeding and
Preserving, American Game
Protective Association

To the Reader: The demand for this article has been so great that the edition of the BULLETIN in which it appeared has been exhausted, hence the present printing. How many of those who read this, remembering that it involves no small expense to prepare and print a work of this sort, will be willing to mail a $1 bill to the American Game Protective Association, covering membership in that body?

Reprinted from the BULLETIN of the American Game Protective Association of February 15, 1916.

@
51565
01

@ 83163

The Mallard—Its Breeding, Shooting and Preserving

By E. A. QUARLES, Director, Department of Game Breeding and Preserving

THE mallard duck, "greenhead," has been termed "the wild duck of the world" by Dr. E. H. Forbush, a designation in which sportsmen will readily concur, for in most sections of the globe it is found in larger numbers than any other variety. It is the species from which nearly all the varieties of domestic duck have been derived.

Of large size, excellent table qualities, a splendid bird for sport and easily bred in captivity in large numbers, it is no wonder that sportsmen are turning with increasing interest to this species with the opening of an era in this country in which it would seem that most of the game must be produced under captive or semi-captive conditions. Again, mallard shooting is obtained at considerably less cost than any other kind of preserve shooting. To him who views the question purely from a commercial standpoint, the mallard offers equal attractions, now that the laws of most of the states forbid the sale of wild game.

Work of Mallard Committee.

In keeping with its custom of presenting with each issue of the BULLETIN a detailed, authoritative article on the latest methods employed in the breeding, preserving and shooting of some species of game in captivity, there is presented herewith an account of the work of the leading producers of mallards. This article has been prepared under the direction of the Committee on Mallard Breeding of the Department of Game Breeding and Preserving, whose personnel is as follows:

Adam Scott, Chairman, Manager Froh-Heim Game Preserve, New Jersey.

Neil Clark, Superintendent, Clove Valley Rod and Gun Club, N. Y.

W. S. McCrea, People's Gas Bldg., Chicago, Illinois.

A. G. MacVicar, Gamekeeper Childs-Walcott Game Preserve, Connecticut.

Howard Scutt, Superintendent Game Breeding Experiment Farm, American Game Protective Association, Connecticut.

The plant chosen for study as the basis of the article was the Froh-Heim Game Preserve on the estate of Grant B. Schley at Far Hills, N. J., which is in charge of Adam Scott. The Clove Valley Rod and Gun Club, Verbank, Dutchess County, N. Y., of which Neil Clark is head gamekeeper, has also furnished valuable material for the article. Messrs. Scott and Clark stand in the front rank of the mallard breeders of this country and have done pioneer work of the greatest value, particularly in devising means for securing the largest measure of sport from birds bred in captivity. Activities in connection with the establishing and maintenance of a mallard breeding plant will be considered in logical sequence.

Captive-Bred Mallards in Flight on the Preserve of W. G. McCrea, of Chicago.

Securing License First Step

The prospective mallard breeder will secure a license from the state game protective authorities as his first step. Most states, at least, require this. The cost of the license runs anywhere from $2 to $5 in the several states, the latter sum being charged in New York. The license permits the killing of preserve-bred game at any time and in any manner. This procured, it remains to determine the number of birds that will be required in order that the correct number of breeders may be secured to produce what is wanted.

Assuming that five mallard drives a season will satisfy the average sportsman, and they should, and that 50 birds should be released for each gun at each of these drives, there should be provided a total of 250 birds for each gun during the season. Estimating further that the average gun will succeed in bagging 20 per cent. of the birds shot at, it will be seen that the prospective breeder should count on rearing an average of 50 birds for each gun that will be represented in the season's sport. This is a minimum. It would be better, perhaps, to raise 75 or even 100 birds for each gun. Some will be needed for breeding purposes the following season, though these should never be sent over the guns, and the surplus can be sold for breeding or market purposes and thereby decrease the cost of the operation.

In considering the figures given above, it will be understood, of course, that birds which escape the guns at any drive can be sent over them again at subsequent drives, an important economy, indeed.

Ratio of Increase 12 to 1.

Mallard breeders estimate that 12 young birds should be brought to maturity for each hen of the breeding stock. Assuming, therefore, that our prospective breeder wishes to provide sport for five guns for the season, he should count on rearing a minimum of 50 birds for each gun or a total of 250 in all. As explained above, however, it would be the part of wisdom and economy to provide double that number, and we shall assume that he will undertake to produce 500 birds. Estimating a production of 12 young to each breeding hen, it will be seen that 42 females (500÷12) should be secured for breeding stock. As one drake is provided for each three hens, the order for breeding stock should include at least 14, preferably 16, males, as some of the drakes may die.

The best time to purchase breeding stock is in the fall, when selected birds from reliable dealers bring $2 each for drakes and $1.50 for hens. These figures are raised to $2.50 and $2.00 for spring-bought birds.

Good Breeding Stock Scarce.

The securing of good breeding stock is one of the hardest problems in mallard breeding. The species degenerates rapidly in captivity unless handled with great skill. The tendency is to take on so much flesh that the sporting qualities of the wild bird are lost. Stock that has thus degenerated is worse than useless and there are, unfortunately, a number of dealers in mallards who impose shamelessly on the public with such birds. Even the skilled breeder must exercise the greatest caution both in feeding and by the introduction of wild blood at frequent intervals to prevent captive birds from losing their sporting qualities.

While the BULLETIN does not undertake to guarantee the birds of any breeder, it considers itself justified in stating that the following dealers have a reputation of furnishing reliable stock:

FROH-HEIM GAME PRESERVE, Far Hills, N. J.

CLOVE VALLEY ROD AND GUN CLUB, Verbank, Dutchess County, N. Y.

JOHN HEYWOOD, Hubbardston, Massachusetts.

WALLACE EVANS, St. Charles, Illinois.

JOHN McCARTHY, Dunnfield, Warren County, New Jersey.

There are, of course, other reliable dealers throughout the country, but the prospective purchaser is warned to exercise extreme caution. Birds are hard to obtain in February and March, as a rule, because most dealers have disposed of their surplus stock prior to that time and are holding only sufficient birds for their own requirements.

Begin With Birds Rather Than Eggs.

A start made with breeding stock is more economical and satisfactory than one made with eggs. For the benefit of any one preferring the latter, however it may be stated that eggs from the best stock average

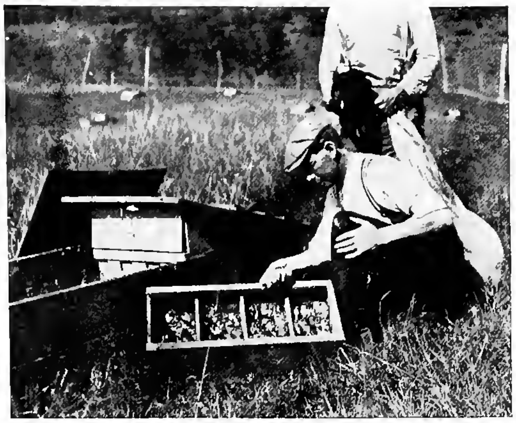


Figure 2.—Type of Coop and Run Used in rearing Mallard Ducklings.

about $3.60 for a clutch of 15 or $25 a hundred. Few dealers care to sell eggs early in the season, when they usually need all their birds will produce for their own purposes. This means that the purchaser must frequently take later laid eggs, some of which may not be fertile.

A late start in incubation subjects the ducklings to the trials of summer heat, rains and sudden changes in temperature, before they have acquired sufficient growth and plumage to afford the protection that early-hatched birds possess. Such birds do not possess as good sporting qualities by the time the shooting season comes around as those that were hatched earlier.

Three-Acre Pen for 200 Breeders.

Prior to ordering the breeding stock a suitable place for its confinement should be provided. This involves the construction of a pen and duck pond and, as this requires rather lengthy and detailed description, it will be considered later on in order to avoid breaking in on the continuity of activities incident to breeding. Suffice it to state at this point that Mr. Scott, who employs 200 breeders, confines them on a three-acre tract fenced with one-inch poultry netting, only three feet high. A small stream that has been dammed furnishes a body of water of approximately 250 square feet and of an average depth of one foot. There follows a detailed description of Mr. Scott's breeding methods:

Breeders Should Be Wing-Clipped.

Breeding stock should be wing-clipped before it is released; in fact, it should be ordered shipped wing-clipped, as the inexperienced are likely to lose birds in taking them out of the crate. Wing-clipping consists of cutting some three or four inches off the primary (long flight) feathers of one wing. It is a common practice to wing-clip breeding stock in September and February. Pinioning frequently interferes seriously with a female's laying and deprives the bird for all time of one of its principal means of escape from danger. Keep the birds from bathing three or four days after they are received if the shipping has involved keeping them from access to water for some time. In such an event their feathers will have lost much of their natural oil, and if they are permitted to get to water immediately on release from the crate, their plumage will become saturated, with imminent danger to the bird of cramps or even pneumonia, particularly if the weather be unfavorable. The best practice is to place water at first where it can be reached only for drinking purposes and, when the plumage shows that it has regained its normal condition, allow the ducks access to the pond.

Mallards do not require the protection necessary for domestic fowl in winter. An open-front shelter 3 feet high in front and sloping to 2 feet in the rear will do very well. The rear should be in the direction of prevailing winds. Many breeders do not provide any other shelter than brush or evergreens.

Winter Ration for Adults.

Once the birds are in condition to be released in the pen, they will require comparatively little attention. Feeding is done at 7 o'clock in the morning and at 4 o'clock in the afternoon. Mr. Scott feeds whole-shelled corn at both times, giving a twelve-quart bucket not quite full at each feed. Should the birds appear "rough" at any time during the winter, an occasional feed of moistened bran, middlings, and corn-meal, equal parts of each, and 25 per cent crissel and 10 per cent grit, mixed with steamed alfalfa, will be found beneficial. Succulent feeds such as lettuce-tops, chopped mangel beets, apples, etc., may be given with profit. Ducks must always have at hand, when feeding, plenty of water, sand, grit and charcoal. They are particularly dependent on water to wash down their food.

Mash for Layers.

In New Jersey mallards commence laying in March, the time varying with the weather. They cease in July, but it is not customary to use eggs laid after June 1. Mallard hens average about 30 eggs a season, but the first laid and last laid are not used for incubation. About March 1—a little earlier if the season is a particulary open one—the ration given above is changed to a mash, fed in the morning. This consists of 6 quarts of wild duck manna (Spratt's) and a little short-cut alfalfa, well scalded with plenty of boiling water, to which is added a mixture consisting of equal parts of bran, corn-meal and middlings, with 25 per cent of crissel (Spratt's dried beef scrap), 10 per cent of grit and some charcoal. Mix the ingredients other than manna and alfalfa dry. Use a trough for mixing and work well with a spade. Then combine the moist and dry portions, mixing well, until a crumbly, not sloppy, mash is achieved. The 200 birds are fed 12 quarts of this mash and it is placed in troughs. Any food left by the birds should be destroyed at once. Always avoid having any mash sloppy, adding bran, middlings and meal if necessary.

The ration fed the layers at night consists of equal parts of cracked corn and wheat.

Nesting Habits of Mallards.

Mallards usually make their nests in undergrowth about the space in which they are confined. Some breeders furnish laying-boxes, about 17 inches square and furnished with straw, but this is not necessary if there be considerable undergrowth in the pen. Eggs should be gathered daily, but care must be taken to leave a nest-egg. A sharp lookout must be kept for crows, which are very fond of the eggs of all birds and frequently cause serious loss. A crow call (to be had of Von Lengerke & Detmold, 200 Fifth Avenue, New York City) re-inforced with a shotgun, will be helpful in combatting these pests. Some breeders place half an egg-shell, filled with raw egg doctored with strychnine, just outside the duck enclosure with good results, but there is always danger of losing a valuable dog in this way Another effective method is to place a decoy nest containing a few eggs outside the pen in which the breeders are confined and surround it with unbaited steel traps.

Place the eggs as they are gathered on end in a cool place where the temperature is equable and turn them daily.

Mr. Scott rejects the first 200 eggs laid for incubating purposes, selling them to the grocery trade. Experience has proved that the first eggs laid are frequently not fertile. When 500 eggs have been accumulated, they are put under domestic hens at the rate of 15 eggs to a hen. Eggs should not be more than 10 days old when used for incubation. Breeders operating on a smaller scale than Mr. Scott will probably do well to commence incubating operations when 100 or 200 eggs have accumulated. Nesting-boxes similar to those shown in Figure 6, page 7 of the October BULLETIN and described on page 6, middle column, 5th paragraph, are used. Some breeders place a sod in the bottom of these boxes to furnish moisture, scooping out the underside a little so that when it is placed on the bottom of the box, grass side up, it will form a saucer-shaped nest. In this a little fine grass or other litter is placed to form a lining for the nest. Mr. Scott uses O. K. litter (Stumpp & Walter, 30 Barclay Street, New York City) instead of the sod, wetting it thoroughly and working it. The litter is specially recommended in country characterized by heavy clay soil. Sod from such soil does not make a good nest base.

Use of Insecticides.

Mr. Scott paints his nesting-boxes once a year, in midsummer, with carbolineum as protection against mites, the tiny, red insects that frequently annoy setting-hens to the point of breaking them up. He also sprays or dips his boxes before the incubating season in diluted carbolated pine (Sanitas Manufacturing Co., 13 Sixth Avenue, Brooklyn, N. Y.) as a protective against lice and other diseases.

The mallard egg is fragile, and a medium-sized domestic hen is best employed in incubating it. Mr. Scott likes the Rhode Island Red, small individuals of the species being preferred. China eggs are placed under the hens at first to make sure of their settled intention to incubate. On the morning of the second day the hens are taken off the nest, placed in slatted coops (Figure 1) and fed, watered

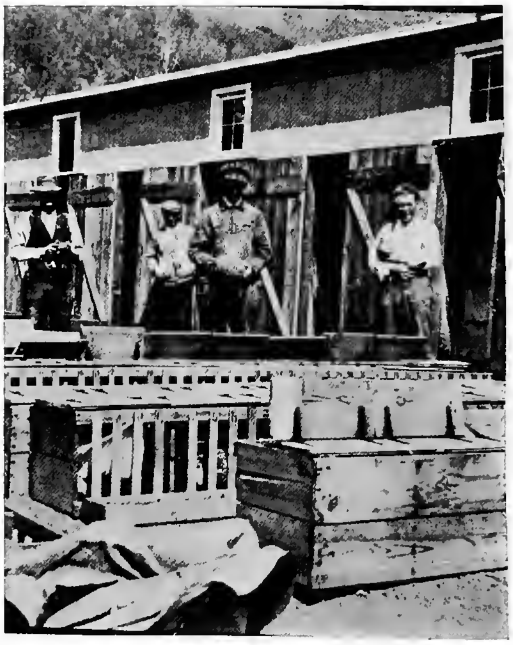


Figure 1.—Hatching-House and Slatted Boxes in Which Setting-Hens Are Placed When Fed.

Mallard Rearing-Field at Clove Valley.

and dusted with pyrethrum, which can be obtained at any drug store. Another dusting is given at the end of the second week if lice appear. The eggs intended for incubation are placed under the hens the third day.

Feeding is done once a day, mornings preferred.

Cracked corn, charcoal and grit or a regular scratch food are employed in feeding. Fouled nests should be cleaned at once and broken eggs removed. Wash in tepid water any eggs fouled by the contents of a broken one, dry with a clean cloth and make a new nest.

Eggs Need Moisture.

In the wild state the mallard hen usually goes to the water for food and exercise daily during the incubating period and, consequently, the eggs get a good wetting on her return to the nest. This daily moistening plays an important part in the development of the embryo. When birds are bred in captivity the same result is approximated by sprinkling the eggs with tepid water from time to time. Mr. Scott, as previously explained, thoroughly moistens the O. K. litter of which the nest is composed and this usually gives sufficient moisture till the last week of incubation, when the eggs are sprinkled daily through the twenty-second day. If it is exceedingly dry, however, he sprinkles the eggs at intervals during the entire period of incubation. The beginner will have to acquire knowledge of the proper amount of moisture by experience mainly.

Use of Incubator.

Mr. Scott does not use an incubator with his ducks, but Mr. Neil Clark employs it in finishing off his batch. He describes his method of procedure as follows:

"I set all my eggs under hens, about 14 under a fair-sized fowl, say a Rhode Island Red. I do not sprinkle the eggs until they have been under the hen for 12 days. After this I dampen them with lukewarm water about twice a week. When the eggs begin to pip I take from the hen some 8 or 9 pipped eggs and put them in an incubator to finish hatching. I run the incubator at about 103. As to moisture, I think it is best to follow the directions that come with each machine. By doing this a lot of ducklings are saved that would have been crushed under the hens in the hatching-boxes. If a hen hatches 2 or 3 ducklings she will usually take to any number given her.

The Prairie State incubator is recommended by some breeders as being particularly good from the standpoint of the regulation of moisture.

Eggs are tested for fertility on the eighteenth and twenty-second days. All poultry supply dealers carry egg-testers.

Mallard eggs take from 23 to 24 days to incubate. Take the hatch off after the last duckling has thoroughly dried, which will be from 24 to 36 hours after pipping commences. A basket lined with leaves and covered with a cloth is a convenient receptacle for carrying the young birds to the rearing-coop. Place the ducklings in the coop first and let the hen follow. The transfer from nest to rearing-coop is usually made in the afternoon and the first feed is given the following morning. This is quite soon enough, as there is plenty of yolk in the body of the duckling to furnish sustenance in the interval.

The rearing-coop (Figure 2) is 22½ inches wide, 27½ inches long, 22 inches high in front, sloping to 10½ inches at the rear. The roof is 26 inches wide and 40 inches long and is stationary. There is a hinged door on one side, 8 x 8½ inches. In front are 3 stationary slats 10½ inches long and 2½ inches wide. Back of them 4 movable slats, 13 x 2½ inches, are made to slide so that the coop may be opened or closed in a moment. Above the slats is an opening 17 inches long and 5½ inches wide, which is covered with half-inch wire cloth or fly-screen. It aids in ventilation when the slatted front is closed. On either side 8 one-half-inch holes are bored 2½ inches from the top as a further aid to ventilation. With each coop are provided 2 boards called "shutters," each 23 inches wide and 28 inches long. One of these furnishes a floor for the coop when the ducklings are placed in it, being removed after the first few days, unless the weather is unusually rainy, and the other is used to shade the front of the coop and prevent rain from blowing in.

The Rearing-Field.

The field in which the rearing-coops are placed should be well drained, with some shade, if possible, and have sufficient vegetation to furnish a considerable quantity of insect life, on which the ducklings thrive. Sloping ground is preferred, as it insures good drainage.

Mr. Scott fences his field off into pens 20 x 25 yards, using three-quarter-inch poultry netting, 2 feet wide, for the purpose. In each of these pens are placed 6 rearing-coops in 2 rows of 3 coops each, facing each other. A space of 3 feet is left between the coops and the two rows are separated by a space of 6 feet. Two 12-inch boards, 7 feet long, are nailed to the sides of each of the two coops that face each other, forming a run for the confinement of the ducklings till they learn their foster-mother's call. This run is divided in half by a cross partition, so as to keep the 2 broods it confines from intermingling. The arrangement is a time and money saver and makes for more even distribution of the ducklings among the hens when the boards forming the run are taken away, which is on the fourth day, unless weather conditions are unfavorable. Fifteen ducklings are allotted to each of the foster-mothers. Rearing-coops are moved every other day, usually, but something depends on weather conditions. When the board runs are removed the six coops are placed in a single row. The ducklings are never shut in the rearing-coops.

Weaned at End of Three Weeks.

The hen mothers are kept confined at all times and fed whole corn, grit and charcoal. The ducklings are weaned at the end of 3 weeks. Access to shade is absolutely necessary to success in rearing young mallards. A shelter from the sun commonly provided is a "table" 4 x 6 feet with 18-inch legs. One of these should be available for each battery of 6 rearing-coops. In addition the "shutter" described in connection with the rearing-coop should be so placed as to enable the brood using that coop to get shade at all times.

At the end of 3 weeks, when the ducklings are weaned, they are placed in an enclosure 20 x 75 yards. The fence is composed of three-quarter-inch poultry netting 2 feet wide and is divided into 3 parts by means of removable partitions. From 90 to 100 ducklings are placed in each of the 3 divisions. This pen should have a grass sod and it is well for one of the divisions to contain trees or shrubbery for shade. The partitions are removed in a short time and the 3 lots of ducklings are given the run of the entire enclosure.

Kept From Water Till Grown.

The ducklings are confined in these enclosures for two months, when they are removed to the enclosure in which the adult stock is kept and have access to water for swimming for the first time. Until this time the water given should be supplied in shallow pans, so that the birds cannot immerse in it. The oil on the feathers of the mother duck in the wild state lubricates the down of the duckling after it has had a swim and prevents its becoming chilled. The foster mother, however, is not provided with a similar safeguard against the saturation of the down of the young bird, hence the precaution against giving the ducklings access to water till they are sufficiently matured to secrete enough oil for the lubrication of their plumage. Drinking-water exposed for any length of time to the sun is likely to cause serious illness to the ducklings.

Complete Rations for Ducklings.

The first feed given the ducklings consists of hard-boiled egg put through a potato ricer and made dry and crumbly by mixing with Scotch oatmeal or the ordinary flake oatmeal. Grit and charcoal (chick size of both) are mixed with this. Two shallow tin or enamel-ware pans are placed in front of each rearing-coop. The food is placed in one of these and water in the other. Feed only so much as the ducklings will clean up and remove any food not taken. It will surely cause sickness if, being left to sour, it is subsequently eaten. Tepid water only is given. Four feeds a day is the rule till the ducklings are three weeks old.

Fifth Day.—Add Spratt's duck meal to ration given above. Scald it separately and then mix it in. Have food crumbly, not sloppy.

Tenth Day.—Add chick grain, scalding it and the duck meal together.

Fourteenth Day.—Add crissel and drop hard-boiled egg from ration. Scald crissel, chick grain and duck meal together and mix in the Scotch oatmeal till a dry, crumbly mass is secured.

Twenty-first Day.—Change from four to three feeds a day. Abandon former ration and substitute Spratt's duck manna, which should be scalded before feeding. It is sometimes necessary, following this, to return to four meals a day if the ducklings do not seem to be making the progress in growth and feathering that they should.

Forty-second Day.—Add equal parts of cracked corn and wheat to duck manna and use cold water to make the mixture adhere.

One Hundred and Second Day.—At this point gradually work into the ration for adult ducks given at the beginning of this article—two feeds a day of whole corn. Start this by giving it as the night feed.

Simpler Feeding Possible.

Where only a few mallards are being reared the above ration can be greatly modified. Wallace Evans, St. Charles, Illinois, manufactures duck foods, as well as Spratt's, Limited, of Newark, New Jersey.

Where mallards are being produced in comparatively small numbers it is not necessary to make special preparation of the field in which the young are to be placed for rearing. An orchard, if not too shady, usually makes a good location.

Preparation of Rearing-Field.

In rearing ducks on a large scale it is the part of wisdom to prepare the field in which the young will be reared so that it will contain the maximum of insect life, cover and succulent food. A good way to attain this end is by sowing the rearing-fields with the following:

Sow at the rate of one-half a bushel to the acre the following mixture:

Red clover, 3 bushels; alsyke, 1 bushel; timothy, 2 bushels; red-top grass seed, 2 bushels; English rye grass, 1 bushel. This mixture is sown the last week in March or the first in April, the ground having been ploughed the previous fall and spread with stable manure. Before sowing, the field is again ploughed and is harrowed both ways. The mixture is then sown with a drill, oats being put in at the same time at the rate of 2 bushels to the acre. Harrowing is done once more. When the oats are three or four inches high, the field is rolled, making a smooth surface for the coops that will be placed on it later. The oats quickly recover from the rolling, and, when mature, are cut and stacked.

Fields thus prepared afford an ideal breeding-place for the insect life which is so necessary to the development of the duckling; they furnish shade and cover, keep the ground from drying up, and give an abundance of succulent food.

It will be noted that clover seed is an important component of the above and it is well to bear in mind that ducklings are particularly fond of this plant. The same ground may be used year after year as a rearing-field provided it is cultivated each year. Bear in mind that the field must be well drained, and that, while ducks are amphibious animals, they require just as dry housing as do domestic fowl.

Mr. Scott changes his drakes every third year. As has been remarked, mallards rapidly degenerate into the barnyard type unless great care is taken in keeping up the strain of wild blood and skillful feeding is resorted to. Fresh drakes may be obtained in three ways: By exchange with or purchase from reputable American breeders; by importation from abroad; by securing wing-tipped individuals.

English Dealers in Ducks.

Hugh Wormald, Heathfield, East Dereham, Norfolk, England, supplies many American breeders with a wide variety of captive-bred wild ducks. Another dealer is Walter D. Trickett, Lench House, Waterfort, near Manchester, England.

Mr. Philip S. Farnham has supplied the BULLETIN with the following list of men who probably would be in a position to furnish wing-tipped birds:

Dr. James R. Wilson, Hebron, Indiana.
Mr. Fogli, Fogli's Hotel, Thayer, Indiana.
Foster Parker, Cayuga, New York.
Harry Crossley, Game Warden, Sandusky, Ohio.
Winous Point Shooting Club. Address John Fitzgerald, Port Clinton, Ohio.

Part II.

Building a Duck Pond—Planting of Duck Foods—Preserving Wild Ducks

WE come now to a consideration of the enclosure necessary for adult birds. A body of water is indispensable to this. The following excerpt from an article on pond construction in the Estate Magazine is by Maurice Portal of Hexham, Northumberland, England, a recognized authority on duck breeding:

"In selecting a site for a pond, an open and exposed spot should be avoided if ducks are intended to adopt it for permanent occupation. Shelter from strong winds wild fowl of all kinds must and will have.

"For this reason an old and uninviting clay pit or brick pond often holds duck and teal. It is well sheltered and with deep banks, so the birds take to it.

Water Should Be Shallow.

"If there exists on an estate a wet and low-lying wood with indifferent timber in it, a clearing of 2 or 3 acres can be made without loss, leaving the trees standing some 40 or 50 yards back off the margin decided upon as the edge of the water. A low bank should be thrown up on lowest side to dam the water back, and if made 9 feet or 10 feet wide at bottom, well sloped off at back, and 3 feet wide on top, it will hold water if the soil is at all full of clay. Lay rough turfs on top and back and ram it well. The height of the bank depends, of course, on the level of ground and depth of water wanted, but do not make the pond more than 1½ feet to 2 feet deep. Provide an overflow and plant rushes in clumps in pond and put some old tree-stumps in at intervals, roots upmost, as duck like a log to sit on at times.

Sun Must Have Access.

"Having got your pond made and water in, see if the sun gets well on it. If it does not, clear a few more trees to allow it to get well on part of the water. On a windy day, observe what parts of your pond afford good and complete shelter from the prevailing wind of your locality. If you find it is not well sheltered and the wind not quite broken, plant a thick screen of shrubs—ribes, broom, beach, dogwood, etc.—to break wind properly. Be sure that your pond, when made, has easy access off land, as ducks hate having to jump or fall into water.

"The actual size of pond does not matter much, but it should be not less than an acre, and 3 acres is large. If it is easy to make to any shape, then one about 70 yards or 80 yards by 35 yards is a very useful and handy size and a good one for seeing duck on.

"Regular feeding is essential; not a great deal,

Driving Mallards at the Clove Valley Club, N. Y., from Rearing-Field to Pond.

but some daily, and the food should be thrown into the water, which prevents rats and birds eating it.

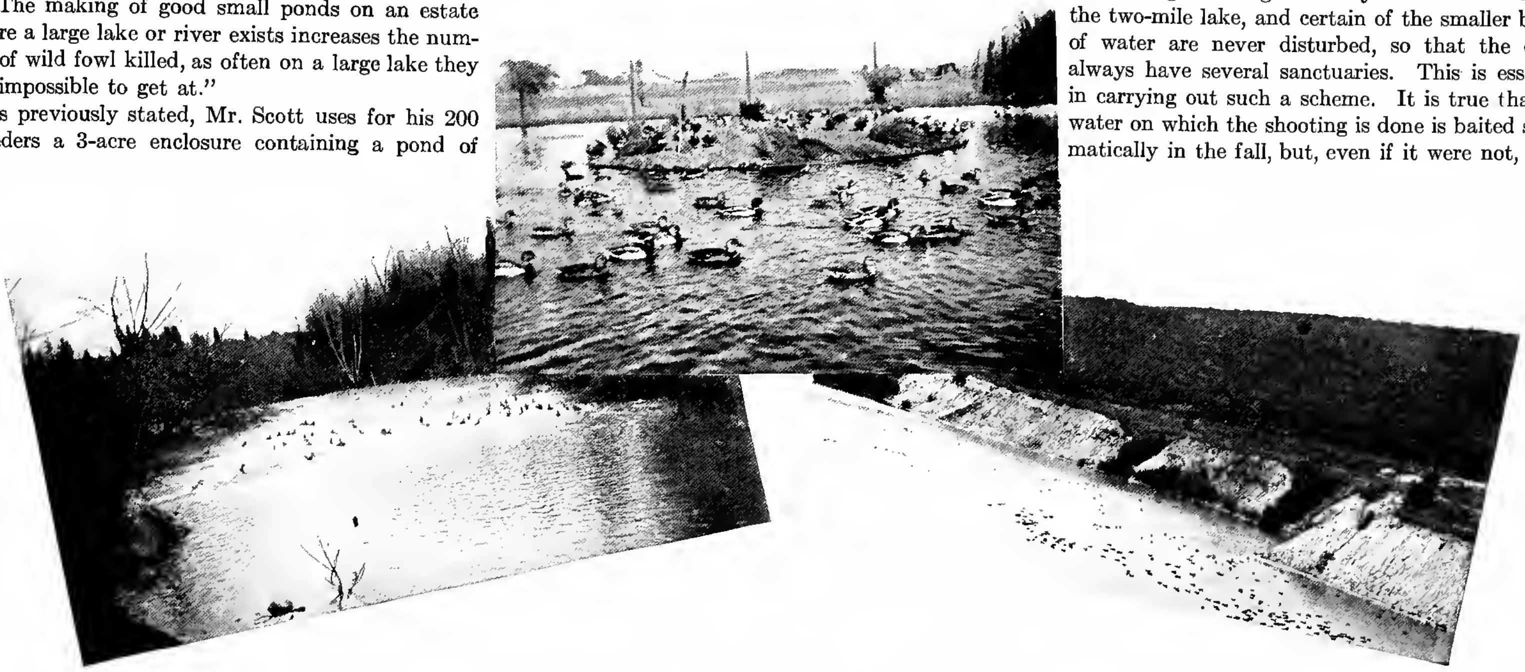
"As to the supply of water, a very little constantly running suffices if the soil is holding. Some of the best ponds are merely fed by a field drain.

"To bird-lovers a good wild-fowl pond is a source of endless interest. During every month of the year there is some fresh characteristic to be noted, and it opens a field of instruction which many would be glad to make use of.

"The making of good small ponds on an estate where a large lake or river exists increases the number of wild fowl killed, as often on a large lake they are impossible to get at."

As previously stated, Mr. Scott uses for his 200 breeders a 3-acre enclosure containing a pond of 250 square feet with an average depth of one foot. One acre of the enclosure is in grass, there is a patch of woodland and a small, swampy area in which the ducks get exercise by digging for insects. Patches of undergrowth furnish protection from vermin and laying-places for the mallard hens. Here and there in the stream that feeds the pond small dams have been placed to give little stretches of water for the ducks to swim and feed in.

THREE TYPES OF PONDS



Above: Pond With Island At California State Game Farm. Courtesy of Superintendent William H. Dirks.
Left: Clove Valley Club, Adapted to Natural Preserve. Right: Clove Valley Club. One type referred to by Mr. Portal.

Fencing the Pen for Adults.

Mr. Scott surrounds his 3-acre tract with a 3-foot fence of 1-inch poultry netting, not run underground. Where the vermin problem is at all bad, however, 7-foot netting, laid 1 foot or more underground to discourage burrowing vermin should be employed and an 18-inch outward overhang at the top of the fence would give added security. This should be in addition to the 7 feet composing the fence proper.

Mr. Lee S. Crandall, chairman of the Department's Committee on the Breeding of Miscellaneous Species of Game, names three things as essential to the enclosure for adult mallards—a pond, a bit of meadow and a certain amount of brush-covered ground or a tract of rank grass.

Mr. Crandall believes that 18 square feet of water surface is sufficient for each duck. He suggests the planting of willows, box, firs and privet for cover. On marshy ground he recommends the planting of cat-tails and reeds. If the pond is large enough, it is well to provide an island. Ducks take strongly to such an isolated body of land. It affords protection from many kinds of vermin and generally contributes to a condition of satisfaction that probably reflects itself in greater egg production. In lieu of an island platforms supported on posts of sufficient height to make them just clear of the surface of the water may be provided. Cleated board-walks give access to them, and they are covered with grass, brush, rushes, or corn-stalks. This practice is followed by Mr. Frederic C. Walcott on his preserve at Norfolk, Conn.

Sloping Bottom Necessary.

In laying out a small pond, care should be taken to provide a bottom sloping toward the outlet so that it may be drained from time to time, as the condition of the water seems to indicate. Small ponds should always contain running water. If it is cold enough to freeze the pond, the ice must be cut to afford some sort of swim to the ducks. Unless they have access to the water their feet are likely to freeze.

What has been written above covers pretty thoroughly the enclosure necessary for the confinement of adults where breeding for commercial purposes or drive shooting of mallards, which will be explained in detail later on, is concerned. There are, however, those who are interested in neither of these, but who, possessing a large acreage of natural duck grounds, may wish to have their shooting approximate the taking of wild ducks as much as possible.

Preserving Wild Ducks.

This problem has been worked out with excellent results on the preserve of Mr. Charles D. Lanier, at Westchester, Connecticut. The country is hilly and far removed from the coast, but is well watered. A comparatively small dam has created in the preserve a narrow and shallow lake some two miles in length. This is filled with wild duck food and upon it black duck are bred by the hundreds, with a few greenheads and quite a number of wood duck. Some three or four small bodies of water have also been created by damming, and to these the ducks resort also.

Shooting is indulged in only on the lower end of the two-mile lake, and certain of the smaller bodies of water are never disturbed, so that the ducks always have several sanctuaries. This is essential in carrying out such a scheme. It is true that the water on which the shooting is done is baited systematically in the fall, but, even if it were not, there would still be ducks by the hundreds on the preserve.

The result of this skillful method of preserving has been that the owner is able to secure all the shooting he wishes every day of the open season, regardless of weather conditions. Wood ducks, of course, are not shot, as they are protected under the law.

Mr. Lanier has contemplated increasing the supply of ducks by breeding greenheads in captivity and seeking to establish them on the preserve. It is to be hoped that he will attempt this.

Planting Duck Foods.

In the case cited immediately above, no planting of wild duck food was necessary, as it already existed and increased greatly with the damming of the stream. There are hundreds of preserves on which a similar scheme might be successfully carried out, but with the additional problem of getting a growth of wild duck food started.

Progress is being made in this problem, but many details apparently are yet to be worked out. In the first place, no continuing supply of wild food is possible unless there is an area of ground suited to planting sufficient to supply many more ducks than those that commonly frequent the preserve. Even so, it would seem that on a preserve in which no natural wild food was found, the plants especially, and possibly the seeds, put out as a start for such growth would have to be protected until they could be made to produce in such abundance as to insure that the ducks would not wipe them out.

In considering duck foods it must always be borne in mind that natural foods are highly conducive to fertility. In fact, lack of this and of the "proper mental state," as Mr. Herbert K. Job points out, are the two main obstacles in breeding ducks in captivity, though these apply in less measure to mallards than to any other species. By "proper mental state," reference is had to the fact that, with many species, a second generation, reared in captivity, breeds with much greater readiness than the parent wild stock.

The measure of success in planting wild foods had been considerably increased since it has been learned that the seeds or roots, as the case may be, that are used in planting, must be kept wet and at a comparatively low temperature. This is nature's method, but it took man a considerable time to learn it.

McAtee Leading Authority

A leading authority on duck foods in this country is Mr. W. L. McAtee, assistant biologist of the United States Bureau of Biological Survey. His three pamphlets, "Three," "Five," and "Eleven" Important Wild Duck Foods, Biological Survey Circular 81, and Department of Agriculture Bulletins 58 and 205, respectively, cover the value, appearance, distribution and propagation of about 60 of the principal wild duck foods, such as wild celery, rice and sago pondweed. The last-named Mr. McAtee considers "the best all-round duck food in North America."

Food of the Wild Mallard.

We still have much to learn regarding the attracting and holding of ducks on preserves in a wild or semi-wild state, and it is in this direction that the most interesting mallard work is likely to be done within the next few years. As an aid to the solution of the problem and for the information of any who may wish to preserve mallards under the conditions noted, it will be of interest to consider briefly the feeding habits of the mallard and something of the nature of its food.

The United States Bureau of Biological Survey found in the examination of the stomachs of 126 mallards, 17 per cent. animal food and 83 per cent. vegetable. The important elements of each were:

Vegetable Predominates in Ration.

Animal Food: Dragon-fly nymphs, fly larvæ, grasshoppers, beetles and bugs. Some mollusks, earthworms and crustaceans were found.

Vegetable Food: Seeds of smartweeds (*Polygonum*); seeds and tubers of pondweed (*Potamogeton*), and sedges; wild rice (*Zizania*) and other grasses; burr reed (*Sparganium*); hornwort (*Ceratophyllum*); water shield (*Brasenia*); widgeon grass (*Ruppia*). Vegetable substances of less importance, but worthy of note were: Wild celery, wild millet, algæ, roots of arrowhead (*Sagittaria*); grapes, dogwood, sour gum, bayberries and the seeds of small aquatic plants such as millweed (*Myriophylum*), horned pondweed (*Zannichellia*), and mermaid-weed (*Proserpinaca*). From an examination of more than 1800 mallards' stomachs, made by the Survey, upon which it is hoped that a report can soon be prepared, it is evident that the species is almost omnivorous.

The wild duck foods treated in Mr. McAtee's pamphlet 81, are:

Wild rice (*Zizania palustris* and *Z. aquatica*), wild celery (*Vallisneria spiralis*), pondweeds (*Potamogeton*), of which eight of the nine most widely ranging species have been found in stomach analyses. Sago pondweed (*P. pectinatus*) is the most important of the lot so far as known. Of the three genera just named, Mr. McAtee states that they furnish one-fourth of the total subsistence of the 16 most important game ducks in the United States, and that all three can be propagated in suitable waters anywhere in the United States. The percentage of the three plants just named found in the stomachs of 209 mallards, was: Rice, 17.13; celery, 2.48; pondweeds, 12.67. The five plants treated in Bulletin 58 are delta duck potato (*Sagittaria platyphylla*); wapato (*S. latifolia* and *S. arifolia*); chufa (*Cyperus esculentus*); wild millet (*Echinochloa crus-galli*); banana water lily (*Nymphaa mexicana*).

Of the last five named it is stated that "though at present of local importance, all are suitable for propagation over most of the United States, and there is no reason why they should not be introduced and take rank among the staple foods of wild ducks in many localities where now unknown."

Plants Valuable for Duck Farms

In the third duck-food publication, Bulletin 205, are treated: Muskgrasses, a large and important group; duckweeds of six distinct kinds; frogbit, thalia, water-elm, and swamp privet, all of great value locally in the South, and capable of propagation elsewhere; eel-grass, a salt-water duck food; widgeon grass, adapted to brackish waters; and three plants for duck farms, namely: watercress, water-weed, and coon-tail.

Regarding the last three kinds, Mr. McAtee says: "The plants considered under this head are distinguished by rankness of vegetative growth, comparative unimportance of their seeds as duck food, and lack of fleshy rootstocks and tubers. These qualities render the plants generally undesirable for propagation as wild duck foods, but they are the very things which make them valuable for duck farms. As a rule, abundant green food is available to wild ducks, but the birds usually have to search for seeds, fruits, tubers, and like forms of concentrated nutriment. The conditions on a game farm are just the reverse. The birds are supplied grain food constantly, but need roughage, particularly of naturally suitable kinds. Plants of rapid, luxuriant growth are necessary and all requirements are fulfilled by watercress, water-weed, and coon-tail."

Some of the wild-duck foods, wild rice in particular, are eaten by moose, deer, and cattle, and fencing is occasionally necessary to prevent this. Carp are very destructive to both rice and celery. Drainage, screens, and poisons are used in combatting this pest.

Transportation Requisites.

The following quotation is from the summary of Bulletin 81, treating of celery, rice, and pondweeds:

> "The one indispensable requisite to successful transplanting is proper care of the seeds, roots, or tubers. These must be kept wet and either sown promptly after gathering, or kept in wet cold storage at a temperature of from 32° to 34° F. The least possible time should intervene between gathering or removing from cold storage and sowing. For shipping, the seeds should be packed in damp moss, sphagnum, cocoanut fiber, or fine excelsior, placed loosely in burlap bags and crated in well-ventilated boxes.
>
> "Wild rice and wild celery are exclusively fresh-water plants, but some pondweeds, including sago pondweed, will grow in salt water. All of the plants thrive best on mud bottoms and in moderate depths of water, wild rice in from 1 to 3 feet, and wild celery and pondweeds in from 3 to 6 feet. All do best in a slight current. Swift or stagnant waters are ill-suited to them, although both wild celery and pondweeds grow in good-sized ponds where there are no currents except those produced by the wind.
>
> "As a general rule, the best time to sow these plants is in the spring, but mowed pondweeds and wild celery pods may be distributed in the fall. Pondweed seeds and wild rice may be sown broadcast as soon as the water reaches a temperature of from 50° to 60° F. Wild celery plants should be set out in May or June.
>
> "The Biological Survey will be glad to identify aquatic plants of interest in connection with duck food, and will recommend plants for use under special and peculiar conditions."

Among the commercial dealers in wild duck foods may be mentioned Clyde B. Terrell, Oshkosh, Wisconsin, and J. B. White, Waterlily, North Carolina. Data relating to planting which has been taken from one of Mr. Terrell's pamphlets, appears on opposite page in tabular form.

Mr. Walcott's Experiments.

Probably Messrs. Frederic C. Walcott and Starling W. Childs, the former being the chairman of the Association's Department of Game Breeding and Preserving, have done as much as any preserve owners in the country in experimenting with the planting of wild foods. This has been carried on at the Childs-Walcott preserve, near Norfolk, Connecticut. The efforts put forth there have been consistent, sustained and intelligently directed.

English Method of Preserving Ducks.

Attention should be called at this point to a method employed in England to attract and hold wild ducks to preserves. This is fully described in an article by Lord William Percy in the BULLETIN of February 1, 1914. Briefly recapitulating the article here, it may be said that wild ducks are trapped throughout the winter and wing-clipped. During the second week in March the stumps of the feathers on the clipped wing of the females are pulled out. Within 18 to 24 days the flight feathers have grown out again, but by that time the migratory instinct has passed and the birds, already mated, of course, proceed to rear a brood in the preserve on which they have been confined. Birds thus reared, it has been found, will return to breed on the same spot themselves the following year. By an intelligent use of this method ducks in great quantities have been induced to breed on many English preserves. Any one attempting this plan in this country would have to learn from experience the best time to pull the stumps of feathers from the wing of the female.

It would seem that some modification of this method might be tried out in this country, particularly on preserves where open water and an abundance of wild food is available through the winter. Whoever shall try this will render a conspicuous service to the game conservation movement, but the permission of the state authorities should first be secured, and none other than an experienced person should engage in the experiment.

Captive Birds Lose Flavor.

For the benefit of the inexperienced it should be stated that the flesh of any wild duck fed on grain

WILD DUCK FOOD PLANTING DATA

By CLYDE B. TERRELL

PLANT?	WHEN?	WHERE?	QUANTITY?	WHAT GOOD FOR?
Duck Potato or Wapato Plants	N.—May 10—July 25 S.—April 1—August 1	Wet places, shallow, fresh or slightly brackish water, 1 in. to 12 in. deep	800 to 1000 per acre	Edible bulb. Attracts all ducks, geese.
" Bulbs	N. S. Fall, before freezing or in spring	Muddy, marshy spots		"
" Seed	N. S. Fall, before freezing or in spring.		10 quarts per acre	"
Wild Celery Seed	N. S. September 10th until freezing	1 to 12 ft. (2 to 7 ft. best), fresh or slightly brackish water, sand loam or mud soil. Soft, rich bottom best	50 to 60 pounds per acre	"
" " Plants	N.—May 15—July 36 S.— May 15—August 5		800 to 1000 per acre	All diving ducks. Canvasback, redhead, bluebill, etc.
" " Winter Buds	N. S. October to freezing. Spring to June 15			
Wild Rice Seed	N.—Sept. 10 to freezing. Opening up to June 1 S.—September—June, when not frozen	Fresh or very slightly brackish water, 3 in.—3 ft. deep. Mud bottom	50 to 60 pounds per acre	Practically all ducks. Mallard, teal, pintail especially. Grain edible.
Wild Rice Plants	N.—May 1—June 25		10 crates per acre	
Chufas (Tubers)	N.—May 1—June 10 S.—April 1—July 1	Rich, sandy soil, flooded in spring	One-fourth to one-half bushel per acre	Wood duck, mallard, canvasback.
Wild Millet Seed	N.—May 1—July 1 S.—April 1—August 1	Moist soil, lowlands, edges lakes, marshes	25 to 40 pounds per acre	Mallards, pintails, teal.
Sago Pondweed Seed	N. S. August 25 until freezing	2 to 6 ft. water, some kinds salt water	1½ to 2 bushels per acre	All water-fowl.

NOTE—N. means Northern U. S. and Canada. S. means Southern United States.

The latest quotations this office has on the above plants are: Duck Potato or Wapato—Plants or bulbs, $.15 each; Seed (small), $1.00 a quart. Wild Celery—Seed, $.35 a pound; Plants or Bulbs (winter bulbs), $.15 each Wild Rice—Seed, $.35 a pound; plants, $.50 a bunch. Chufa, $.50 a quart. Sago Pondweed, $1.00 a quart; plants, $5.00 a crate. Wild Millet, $.20 a pound. Large discounts are given from the above prices for orders in quantities.

---

in captivity within the course of a few days assumes the flavor of that of a domestic duck. In other words, it is held by many that it is the wild celery and other foods the ducks have access to that give them their superior flavor. This fact makes experiments in raising wild foods and locating ducks on preserves in a wild or semi-wild state so that they will have access to such foods of very great interest. The commercial breeder who can learn to rear mallards in large numbers on a wild-food diet at moderate expense, can secure high prices from clubs and hotels for all he can produce, for such birds will have the flavor of the wild species, and as the laws of most of the states forbid the sale of wild ducks, he will have a larger demand for his output than he can supply.

Black Ducks Hard to Rear.

Strange as it may seem, the black duck, so near a relative of the mallard, cannot be produced in captivity in large quantities. The reason is excellently given in an article by Mr. Lee S. Crandall in the Outdoor World and Recreation of April, 1913, as follows:

"At the outset it should be understood that the mallard is the only wild duck which, in the present state of our knowledge, can be produced in captivity in large numbers and at a pecuniary gain. The only possible exception is the black duck (*Anas rubripes*), which has been spoken of often as being susceptible of domestication as the mallard. This, however, is hardly the case. While the black duck is undoubtedly closely allied to the mallard, its nature is the direct antithesis of that of its congener. While the mallard takes to captivity as it does to the proverbial water, its dusky relative sulks and hides away for months before becoming reconciled. The ducks will seldom lay until they have been in captivity for a considerable length of time and then the slightest disturbance at any stage of their setting will cause instant abandonment of the project for the season. The young are as wild and unmanageable as those of hawks might be expected to prove, if they could but run about as freely as the more precocious ducklings. The writer does not know of a single instance in which black ducks have been reared in anything like large numbers under conditions of absolute captivity and strongly doubts that the species ever will rival the mallard for this purpose."

On the other hand, however, there are many instances in which black ducks have been reared with comparative ease in small numbers in captivity. Mr. John B. Burnham informs me that a few wild individuals he had bred freely and became so tame they would allow the attendant to catch them.

Mr. Heywood's Success

So far as I am informed, the most successful breeder of black ducks in captivity is Mr. John Heywood, of Gardner, Mass. He tells me that the secret of success lies largely in having patience with the birds during the early years of their captivity. In his experience it has taken the hens from three to five years to commence laying. The birds have been kept entirely to themselves, being confined in winter in an enclosure surrounded by a fence three feet in height. Access to a spring-fed pond is given, and the birds have no trouble keeping this open in cold weather. In the spring and summer wider range is given, but all birds are either pinioned or wing-clipped. Mr. Heywood has employed with some success the English method of wing-clipping and pulling the feather stumps of the female in the spring, as previously described. He has captive-bred black duck for sale at $5.00 a pair.

Dr. George W. Field, chairman of the Commissioners on Fisheries and Game of Massachusetts, writes: "We have had no substantial success in breeding black ducks. We are, however, making great gains by the reservation method, and using mallards for the purpose of impressing the black ducks with the safety of the reservation for breeding."

Black and Mallard Crosses.

Black ducks cross with the mallard in the wild state, and hybrids are frequently shot. The same is true with regard to the two species when placed together in captivity. At the Narrow Bay Club, on the south shore of Long Island, there is unmistakable evidence of crossing between individuals of the two species kept as decoys, and the same thing has happened at other south shore clubs, I am told. In fact, these hybrids have proved valuable in preventing gunners from mistaking live stool for wild birds. Mr. Burnham and Mr. Julian Burroughs, son of the naturalist, report frequent instances of crossing.

It does not follow, however, that crosses can be secured in every instance, and there are experienced breeders who have been completely baffled in their attempts to secure them. Mr. Johnson, head gamekeeper for Mr. J. C. Phillips of Wenham, Mass., has secured successful crosses by mating a black male with a mallard female.

Vermin Problem Troublesome One.

The vermin problem is an ever-present one with the mallard breeder. Crows and rats are usually the cause of greatest trouble. Defense against the former has already been discussed. The reader is referred to "Rats and Rat Riddance," by Dr. E. H. Forbush, ornithologist of the State of Massachusetts, State House, Boston, and to Farmers' Bulletin No. 369, U. S. Dept. of Agriculture, by David E. Lantz, for the most valuable treatises on the subject that I know of. Dr. Forbush recommends the Schuyler trap, among other things, for use in the battle with the rats. Be sure that you are not furnishing food and shelter to these creatures, for your work will be doubly hard if you are. Mr. J. P. Kellogg states that the Pasteur rat virus has been employed successfully in protecting mallards from rats at the Rumson Country Club, Rumson, N. J. The address of the Pasteur Company is 361 West 23rd Street, New York City. The vermin trap manufactured by Wallace Evans, St. Charles, Ill., is invaluable for cats, skunks and like vermin. This is sold at $8. It is well to use in constructing fences enclosing pens at fairly frequent intervals posts 10 or 12 feet high and to place on these Number 1 Oneida jump-traps, unbaited, for hawks and owls. They naturally come to such convenient perches for a survey of the pen before proceeding to the work of destruction. The great horned owl is the most destructive of its family.

The snapping-turtle must not be overlooked. He is a perfect engine of destruction. Dynamite will exterminate him in small ponds, but if larger bodies of water are involved, steel spring traps baited with chickens and placed on the shore near the water have been found effective. Mink, herring-gulls, black snakes, bass and large pickerel also are enemies of ducklings.

Precautions Against Disease.

Mallards are wonderfully healthy birds, and it is rare indeed that any illness develops where they are reared in small numbers. As in all game breeding, the best defense against disease is to omit no precaution to prevent its getting a start. The observance of these fundamental precautions will aid:

1. Never place young ducks where there is not an abundance of shade right at hand. Adults need shade also, but they are not so susceptible to the sun's rays as ducklings.
2. Do not overcrowd.
3. See to it that young and old always have a perfectly dry place both for sleeping and for retreat in the daytime.
4. Do not expose to the sun the water given young ducks to drink.
5. Remove all food not eaten by ducklings.
6. Segregate sick birds at once.
7. Burn the bodies of all birds that die of disease and spade and quicklime the pen in which they have been confined.

Limberneck or straddles is the disease most commonly met with in young mallards. It manifests itself in a loss of control of the muscles of the neck or those governing locomotion, hence the two names by which it is known. It is thought to come from undue exposure to the sun and is believed by some to result from a form of sunstroke or apoplexy. It is particularly likely to manifest itself in a succession of very humid days.

Part III.

Mallard-Driving—Least Expensive of All Farms of Sport with Preserve-Bred Game—Commercial Side of Duck Raising.

MALLARD driving is the form of sport that most breeders of the species for sporting purposes resort to in this country. It cannot be said to have attained widespread popularity as yet, but it has undoubtedly increased considerably, in the East, at least, within the past few years.

I have been informed that the first duck drive was held on the estate of Sir Richard Graham in England. I am unable to ascertain the date. I suppose, therefore, that we have undoubtedly derived this departure from the ordinary method of duck-shooting from our English cousins. The first duck drive in this country of which I have any record took place at Allamuchy, N. J., in either 1900 or 1901. I am unable to say definitely which year it was. The drive was held on the estate of the late Rutherfurd Stuyvesant, who did so much toward establishing the ringneck pheasant in the East.

Enthusiasts in duck-driving claim for it, among other things, these advantages:

1. That it is the least expensive form of sport to be had with preserve-bred game.
2. That very little ground is needed for carrying it on successfully.
3. That while it appeals to the keenest sportsman, it is also adapted to the man who can no longer meet the exactions of field shooting.

Objections Urged Against Driving.

There are those who find objection to driving. These claim principally that it is cruel, and further, that it is a particularly objectionable form of what some one has termed "canned" sport.

From my own observation I can say that driving might be justly charged with being both cruel and a tame form of sport, but, as I have seen it conducted, I do not think either of these strictures could rightly be laid against it. In other words, it is subject to abuses, just as field shooting, pheasant-driving, and every other form of sport is. I feel very sure that the type of sportsmen practicing driving in the East at present will continue to conduct it on the high plane of sportsmanship that has thus far characterized it, and that means without cruelty, of course, for the real sportsman is as tender of heart as a child.

In driving, ducks are not infrequently slightly wounded and fly a considerable distance before coming down. In order to divest the sport of cruelty, attendants with rifles should make careful note of each bird thus hit and put an end to its suffering forthwith.

I have seen one of the foremost workers in the Audubon Society movement enthusiastically engaged in this sport. He is one whose loyal devotion to wild life conservation and to everything that is best in sport no one could doubt for a moment.

As to the charge of tameness, I invite any one harboring this suspicion with regard to the sport to a view of mallard-driving as conducted on the estate of Mr. Grant B. Schley at Far Hills, N. J., where, under the carefully laid plans and long experience of Mr. Adam Scott, the stage is so cunningly set, the well-conditioned birds so superb in flight, as to give most of the thrills of blind shooting with a minimum of its discomfort.

In the conduct of most duck drives the practice is to release the birds beyond the top of a hill when possible, and station the guns at the bottom of the hill, behind butts, or blinds, with the pond and enclosure in which the birds have been fed several hundred yards to the rear of the guns. The ducks when released naturally fly to the water and place of feeding and, as the guns are stationed on a line between the place of release and the water, the birds usually fly over them. Well-conditioned birds come with the speed of rockets. They almost invariably get a glimpse of the crouching guns some time before the butts are reached, and then ensues an impetuous climb skyward that is likely to test the skill of the most experienced wingshot.

Preparations for duck-driving at Froh-Heim start about the middle of September. The first move is to get the birds accustomed to the trip from the pond to the top of the hill, where they will be released later on in the season for the drives. This is done by spreading a thin trail of corn a distance of approximately 200 yards daily till the place of release has finally been reached. Once the top of the hill has been arrived at, the ducks will naturally fly home to the pond. This practice flying, as it were, is carried on twice weekly till the first of November, when the initial drive is usually held. Ducks fly higher and stronger if the drives are postponed till settled cold weather sets in.

Birds Released From Hill Crest.

The day previous to a drive the birds are led from the pond to the top of the hill by a trail of grain, as usual, but, instead of being permitted to fly home, are confined in covered pens of 1-inch mesh, 4 feet high, 150 to 200 birds being placed in each pen. The wire covering of the pen is extended down the front to form a door, through which the ducks are released from time to time as the drive progresses. The ducks are given a little grain after confinement, but no water.

At Froh-Heim the releasing pens are placed in a strip of woodland and about 50 yards back from its edge. From three to five ducks are released from the pens in succession at intervals of two minutes each. The release is effected by pulling away the loose wire forming the front of the pen at one corner a sufficient distance to permit of the egress of the required number of birds. The ducks usually walk to the edge of the woodland, toward the light, and, once arrived at open country, take wing for the home pond, passing over the guns at the bottom of the hill, of course.

On some estates a "ride" or vista is cut through the woodland. The birds are released in this and take wing a little earlier, flying toward the light, but this detail seems more or less immaterial. On some estates also it is arranged so that a strip of woodland intervenes about half-way between the point of release and the guns, thereby giving higher flight, but care must be taken that sufficient space intervenes between the point of release and the guns, or the ducks will be thrown completely out of range.

At Froh-Heim the distance from the point of release at the top of the hill to the pond is approximately 800 yards, and the butts are placed about half-way between. There follow certain details which the beginner in duck-driving will find of value:

Important Details About Driving.

In penning birds for a drive keepers allow a minimum of 75 ducks to each gun.

The larger the number of releasing pens employed the wider will be the distribution of flight. They should not be nearer than 30 yards to each other.

Butts are placed 30 yards apart. They are composed of a simple framework to which evergreens are attached. An ammunition stand is furnished by a post, topped with a board, inside each butt.

The employment of woodland in which to release birds adds greatly to the sport of driving. It masks the release and gives a naturalness to the flight.

Once a week is as often as drives can be held. The birds that escape the guns one week can be used the week following without trouble if handled skillfully. Despite the reception they get in going over the butts the ducks that get by, in large measure, go straight to the pond and settle there. The keeper can immediately go among them without unduly alarming them.

Care should be taken that plenty of space, a minimum of 450 yards, intervenes between the butts and the pond, as otherwise wounded birds will fly over the water in their fright and, being unable to get back to it, will be lost.

Do all your feeding in or about the pond from the time the ducks are first put in the enclosure surrounding it, when they are two months old. This is essential to the success of driving.

Have keepers wring the necks of wounded birds at once. Shoot with a rifle those which cannot be caught.

Allowance must be made for strong winds in placing the butts, otherwise the birds are likely to fly clear of the guns.

Construct butts so as to be movable.

At a shoot I attended at Far Hills during the past fall, 700 mallards were released in the course of two hours to the seven guns that were present, and the day's bag totaled 142 birds.

Under the laws of New York, New Jersey and Connecticut mallards reared within a wholly enclosed preserve may be taken in any way at any time, but November is the month in which duck drives are usually held, it being too warm prior to that time, and too cold as winter comes on to furnish sport.

Commercial Side of Breeding.

The demand for mallards for the table does not arise till settled cold weather comes. If they could be marketed when three or four months old, there would be a good profit in rearing them for the table, but from the time they are two months old till cold weather comes they consume a large amount of food. It is estimated that it costs from 75 cents to $1 to rear a mallard to the age of two months, and from $1 to $1.25 to January 1. Undoubtedly, the best money to be had from mallards at the present time is through the sale of eggs and birds for breeding purposes, and the wilder the blood the breeder can furnish, the better the prices he can command.

New York is the great market for mallards, but the conservation law forbids the bringing in of preserve-bred ducks from other States except alive and for breeding purposes. The New York breeder must secure tags from the Conservation Commission at Albany, to be attached to each duck, before shipping. Birds are shipped undrawn and with the feathers on. They are killed by a stab with a sharp, thin-bladed knife in the roof of the mouth. After thorough bleeding and the complete departure of heat from the body, the carcases are packed in well-ventilated crates (do not wrap the bodies in paper or cloth) and shipped to market. If settled cold has not set in, it is the part of wisdom to ice the birds.

The New York Market.

A leading New York wholesaler bid me to-day, January 18, $3.00 a pair for 100 pairs of preserve-bred mallards, and a retailer catering to Fifth Avenue trade said he would be glad to get 50 pairs, but could not find the birds. He did not bid, but would undoubtedly have paid $3.50 to $4.00 a pair. It is probable that a breeder could secure this month from $4.00 to $5.00 a pair for preserve-bred mallards, if sold direct to a hotel or club.

As previously stated, I am of the opinion that an excellent commercial reward awaits the breeder who can turn out mallards in large numbers and arrange it so that they can get their sustenance on natural foods, thereby acquiring the flavor of the wild bird. This would give a perfect substitute for the wild ducks, whose sale is now prohibited by nearly every state in the Union. The hotels would welcome it with open arms and high prices. It has been suggested that good flavor might be obtained by putting mallards on wild food a week or two before marketing. Experiments along this line would be interesting.

Help for Beginners.

In conclusion, I will state that the Association's Department of Game Breeding and Preserving stands ready to aid with advice and counsel any one wishing to engage in mallard-breeding for either sporting or commercial purposes, though I have tried in the above to give as complete an outline as possible of the information the beginner will require.

BULLETINS previously published on the breeding of bob-white quail and ruffed grouse will be sent for ten cents each. Further authoritative articles on the breeding in captivity of other interesting species of game will appear in future BULLETINS. Every sportsman should secure the April BULLETIN containing the stenographic report of the proceedings of the second national conference on game breeding and preserving, to be held in New York City, March 6 and 7. The data it will contain will be invaluable.

CALIFORNIA'S INTERESTING BULLETIN

Special notice is due the quarterly published by the California State Fish and Game Commission under the editorship of Mr. H. C. Bryant, the well-known Pacific Coast ornithologist. It is of substantial size, covers a wide variety of subjects of interest to out-of-doors people, and its articles are both readable and authoritative. The bulletin is by far the most impressive publication of its kind. California sportsmen are fortunate in possessing such an organ.

I have watched the work that your Association has been doing with considerable attention, and I am delighted with the progress that you are making. You have gone about the whole thing properly, shown wisdom and thoroughness in all that you have done. I am sure that every real sportsman in the country is heartily in accord with your work, and the objects of your Association.—ARTHUR L. LIVERMORE, New York City.

"Louisiana, A Sportsman's Paradise," is the title of an interesting pamphlet by Stanley Arthur Clisby, which is published and circulated by the Association of Commerce.

GAMEKEEPERS WANTED.—A few gamekeepers of unquestioned ability and character can be placed. Address E. A. Quarles, American Game Protective Association, 233 Broadway, New York City. Employers wishing gamekeepers should communicate with Mr. Quarles. There will be no charge for this service.

PHEASANTS, DUCKS AND QUAIL.—Reliable dealers in birds and eggs are requested to send their price lists to the Department of Game Breeding, American Game Protective Association, 233 Broadway, New York City.

MALLARD-DRIVING ON THE ESTATE OF GRANT B. SCHLEY.

Taking a Shot to the Rear.—Note Butt Behind Which Guns Are Placed.

Adam Scott Counting the Day's Bag.

Eagerly Awaiting the Beginning of the Drive.